Glaciers

ESSENTIAL CLIMATE VARIABLE (ECV) FACTSHEET

GLOBAL CLIMATE OBSERVING SYSTEM
KEEPING WATCH OVER OUR CLIMATE

Domain: Terrestrial
Subdomain: Cryosphere
Scientific Area: Snow and Ice
ECV Stewards: Huilin Li

ECV IN BRIEF

Glacier changes provide independent and reliable evidence of climate change. Past, current and future glacier changes impact global sea level, the regional water cycle, and may increase local hazard risks.

ECV Product

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DEFINITION</th>
<th>FREQUENCY</th>
<th>RESOLUTION</th>
<th>REQUIRED MEASUREMENT UNCERTAINTY</th>
<th>STABILITY</th>
<th>STANDARDS/REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLACIER AREA</td>
<td>Area covered by glaciers (per glacier)</td>
<td>Annual (at end of ablation season)</td>
<td>Horizontal (at the end of the ablation period) 15-30 m</td>
<td>5%</td>
<td>na</td>
<td>IGOS (2009), Paul et al. (2009), Zemp et al. (2013)</td>
</tr>
<tr>
<td>GLACIER ELEVATION CHANGE</td>
<td>2d map of change in height of surface of glacier</td>
<td>Decadal</td>
<td>Horizontal 30-100 m x vertical 1 m</td>
<td>2 m/decade</td>
<td>1 m/decade</td>
<td>IGOS (2009), Paul et al. (2009), Zemp et al. (2013)</td>
</tr>
<tr>
<td>GLACIER MASS CHANGE</td>
<td>Annual change in total mass of glacier (at the end of the ablation period)</td>
<td>Seasonal to annual (the latter at end of ablation period)</td>
<td>Vertical: 0.01 m per 10 kg/m² (at point location)</td>
<td>Better than 200 kg/m²/year (glacier-wide)</td>
<td>na</td>
<td>IGOS (2009), Paul et al. (2009), Zemp et al. (2013)</td>
</tr>
</tbody>
</table>

1 Current Products and Requirements as in the Implementation Plan 2016 (GCOS-200). GCOS is reviewing and will update the requirements until 2022. More information on: gcos.wmo.int and climatedata.wmo.int.
Data Sources

In Situ Data:
- WGMS MetaData Browser and Data Access
  http://wgms.ch/
- Global Terrestrial Network for Glaciers (GTN-G) Data Explorer
  http://www.gtn-g.org/data_catalogue_glims/
- Glacier Thickness Database (GlaThiDa)
  https://www.gtn-g.ch/data_catalogue_glathida/

Satellite:
- Satellite ECV Inventory by the CEOS/CGMS Working Group on Climate (WGClimate)
  http://climatemonitoring.info/ecvinventory
- GLIMS Glacier Database, NASA
  http://glims.colorado.edu/glacierdata/
- Randolph Glacier Inventory (RGI)
  https://www.glims.org/RGI/

Change in Glacier Mass

Global annual mass change of reference glaciers

Source: https://wgms.ch/data/faq_/FAQ_RefGiac_Global_Annual_MB.svg


This list provides sources for openly accessible data sets with worldwide coverage for which metadata is available. It is curated by the respective GCOS ECV Steward(s). The list does not claim to be complete. Anyone with a suitable dataset who would like it to be added to this list should contact GCOS.